

mythology and religion, on topography and monuments, and on art and handicraft and the inscriptions of the Greeks and Romans, in relation to their domestic and national life. The Language group will include elementary Sanskrit, the comparative grammar of the Indo-European languages, and the history of alphabets.

FORTUNATELY the demands of science are sometimes so urgent, that they cannot be resisted, as in the case of the School of human anatomy at Cambridge, which has so outgrown its accommodation that a new dissecting room must be immediately provided, pending the expected erection of really adequate buildings for the medical schools some years hence. There are sixty students dissecting this winter, under Dr. Creighton, and several assistant demonstrators. In the interests of health and education, a large room is to be built over the present lower rooms at a cost of 600*l.*, which will supply the pressing need of space.

It is satisfactory to learn that physical science will be represented among the three representatives of Trinity College sitting with the Cambridge University Commissioners, by Mr. Trotter, who has taken a very influential part in framing the new statutes of his college, and that Prof. Bonney is one of the representatives of St. John's College. We wish that we might hear that other colleges sent equally accredited men of science to strengthen the cause of physical science before the commissioners.

A VACANCY having occurred in the professorship of botany at the University of Innsbruck by the transference of Kerner to the important chair at Vienna as successor to Fenzl, Dr. Peyritsch, director of the botanic garden at Vienna, has been appointed to the professorship at Innsbruck.

THE Zurich University has just granted the diploma of Doctor of Philosophy to Miss Helene Druschkovitch, from Vienna, after a brilliant defence of her dissertation on the "Don Juan" of Byron.

THE Geneva University numbers 391 students, of whom 208 are not matriculated. Out of the 391 students 212 are Swiss, and the others are strangers; there are forty-five ladies, of whom five, Russian, are matriculated.

### SCIENTIFIC SERIALS

*Zeitschrift für wissenschaftliche Zoologie*, vol. xxxii., part 1. —J. Brock on the sexual organs of cephalopoda, first memoir, dealing with sepia, loligo, sepiola, eledone, pp. 116, 4 plates. F. E. Schultze, researches on sponges, sixth part, the genus spongelia, 41 pp., 4 plates. —L. Löwe, on the anatomy of the gills of *serpula*, 30 pp., 1 plate.

*Morphologisches Jahrbuch*, vol. iv, part 4. —Contribution to the anatomy and histology of the sexual organs of osseous fishes, by J. Brock, Erlangen, 68 pages, describing very many forms, 2 plates, with figures from eleven genera. —The folds of the mucous membrane in the human palate, by C. Gegenbaur, with 1 plate, giving a comparison between the palatal markings of human foetuses and those of the orang, cercopithecus, and ateles. —On the female sexual apparatus of *Echinorhynchus gigas*, by A. Andres, 1 plate. —The extensor muscles of the calf and foot of mammals, by G. Ruge, a very extensive inquiry, 52 pages, 4 plates, followed by another from the same author on the deep muscles of the sole of the foot, with 2 plates. —On *Labyrinthodon Rütimeyeri*, by R. Wiedersheim. —On the homology of segmental organs in annelids and vertebrates, by Max Fürbringer.

*Kosmos*, November. —On Bacon of Verulam, the founder of modern realism, by Fritz Schultze. —The origin and evolution of sensory organs (eye and ear), by Ernst Haeckel. —Colour in animals and plants, by A. R. Wallace, translated from the English. —On the political constitution in primitive grades of culture, by M. Kulischer. —Report of the meeting of the German Anthropological Society.

December. —On the discovery of the soul, by G. Jäger. —Colour in animals and plants, by A. R. Wallace, concluded. —The elasmotherium of the diluvium.

January. —Philosophic reflections on the nebular hypothesis, by Carl du Prel. —The mathematical basis of the structure of the plant body, by Dr. S. Gunther. —Dissimilarity between the male and female of *Epicalia acontius* by Fritz Müller. —Primitive constitution; part 2, federation, by M. Kulischer.

THE *Bulletin de l'Académie impériale des Sciences de St. Pétersbourg* (t. xxx. No. 3) contains the following papers of interest:—

On an application of the finite differential calculus, by F. Minding. —On some extraordinary muscles, *tensores fasciae suralis*, in man, by Dr. W. Gruber. —On a new species of *ossiculum supernumerarium carpi* in man, by the same. —Palaeontological observations regarding M. Danilewsky's journey to the Manytsch, by V. Möller. —Supplementary observations to a monograph of the *Rhinoceros tichorhinus*, by J. F. Brandt. —New researches on the ichthyology of Central Asia, by K. Kessler. —On the tail of comets, by M. Bredikhine.

THE *Sitzungsberichte* of the Vienna Academy of Sciences (Physical, Chemical, and Astronomical Section, vol. lxxvi. parts 2-5, vol. lxxvii. parts 1-3) contain the following papers of interest:—On some maxims and proofs of the theory of the resultant, by Dr. B. Igel. —On a relation corresponding to the linear differential equations of the second order, by Dr. A. Winckler. —Researches on the compounds of the camphor group, by J. Kachler. —On the state of heat equilibrium of a system of bodies with reference to gravitation, by J. Loschmidt. —On a new radiometer, by Dr. J. Puluj. —On the substances found in crude anthracene, by Dr. O. Zeidler. —On the behaviour of camphor towards chloral hydrate, by the same. —On the orbit of Loreley (165), by Dr. G. Gruss. —On the behaviour of acetylene towards concentrated sulphuric acid, by S. Zeisel. —Researches on the heat-conducting capacity of cotton, sheepswool, and silk, by J. Schuhmeister. —On the action of ammonia upon isatine, by Dr. E. von Sommaruga. —On idryl, by Dr. G. Goldschmidt. —On the action of hydrochloric acid upon resorcin, by L. Barth and H. Weidel. —On the behaviour of certain resins and resinous acids when distilled over zinc dust, by G. Ciamician. —On the smallest absolute number of sound impulses which is necessary for the production of a tone, by Prof. Pfandl. —Report on Egger's electro-magnetic motor, by Prof. R. Handmann. —On the stand-aneroid-barometer, by Dr. Anton Schell. —On citramalic acid, by Th. Morawski. —On the temperature of Vienna, deduced from observations during a century, by Dr. J. Hann. —On a partial differential equation of the first order, by Dr. Franz Hoyer. —On the connection of  $n$  different straight lines in a plane, and certain other mathematical maxims, by S. Kantor. —On the magnitude and position of the optical elasticity axes in gypsum, by V. von Lang. —On mononitropyrocatechine, by Dr. R. Benedikt. —On some problems in the theory of elastic after-effects, and on a new method of observing oscillations by means of mirrors, without incurring the oscillating body with a mirror of considerable mass, by Dr. L. Boltzmann. —On the orbit of *Laurentia* (162), by K. Zeller. —On the application of Doppler's principle on the progressing motion of luminous gas molecules, by Prof. Pfandl. —On some mathematical maxims relating to cone projections, by E. Weyr. —On the chemical nature of peptone and its relation to albumen, by Dr. E. Herth. —On the barometrical pressure at Vienna, by Dr. J. Hann. —On a new apparatus for the direct volumetric determination of the moisture of the atmosphere, by Prof. Fr. Schwachhöfer. —On the heat-capacity of mixtures of methylic alcohol and water, by E. Lecher. —On the electric after-currents of transversely magnetised iron rods, by Prof. H. Streintz. —On the velocity of transmission of spark-waves, by E. Mach, O. Tumlirz, and C. Kögler. —On the behaviour of propylglycol at a high temperature, by E. Linnemann. —On the direct transformation of isobutyl iodide into trimethylcarbinolamine, by B. Brauner. —On the artificial malic acid made from fumaric acid, by F. Loidl. —On Maxwell-Simpson's synthesis of acroleine from acetone diiodide, by Dr. O. Voelker. —On the behaviour of  $\beta$  bibromopropionic acid towards iodide of potassium, by V. von Zotta. —Determination of the orbit of comet II 1874, by E. Wenzel. —On Ampère's electrodynamic fundamental experiments, by A. von Ettingshausen. —On bixine, by C.ETTI. —On the decomposition products obtained by fusing hydrate of potash with an ammonia gum resin from Morocco, by Dr. G. Goldschmidt. —On the action of bromine upon phenoldisulphonic acid, by M. von Schmidt. —On the construction of tangents to a rotation plane, by H. Drasch. —On some oxidation products of protocatechic acid, by Dr. M. Gruber. —On trisulfoxybenzoic acid, by Dr. M. Kretschy. —On the variation tone observed by Dvorak, by A. Haberditzl. —On the reduction of ellagic acid by means of zinc dust, by L. Barth and G. Goldschmidt. —On a fluoresceine-carbonic acid, by Dr. J. Schreder. —On the galvanic polarisation of platinum in water, by Franz Exner. —On trinitro- and trinitrophloroglucine, by Dr. R. Benedikt. —On the determination of the focus of the outlines of planes of the second degree, by C. Pelz. —On a synthesis

of pimelinic acid, by A. Bauer and J. Schuler.—New experiments to test Doppler's theory on the change of tone and colour by motion, by E. Mach.—On the magnetic declination and inclination at Vienna, by J. Liznar.—On the component parts of coralline and their relation to the colouring-matters of the rosaniline group, by C. Zulkowsky.—On the diffusion of carbonic acid by water and alcohol, by J. Stefan.—On the electromotive power of metals in the watery solutions of their sulphates, nitrates, and chlorides, by Dr. F. Streintz.

THE *Sitzungsberichte* of the Vienna Academy of Sciences (Physiological and Anatomical Section, vol. 76, parts 1-5) contain the following papers:—Observations on the origin of the cell nodule, by S. Stricker.—On the nerves of the cornea and its vessels, by Dr. L. Königstein.—On the properties of dialysed albumen, by Dr. M. Lapschinsky.—On the occurrence of two different knots of vessels in the kidney, by Dr. O. Drasch.—On some peculiar products of mycotic keratitis giving the amyloid reaction, by Dr. A. Frisch.—On the chemical reaction of the retina and the visual nerve, by Dr. A. Chodin.—On the laws of nerve irritation, by Dr. E. v. Fleischl.—On the termination of the olfactory nerves, by S. Exner.—On optional and cramp movements, by E. Brücke.—Researches on the perception of locality and its relation to the idea of space, by S. Stricker.—On the anatomy of the thalamus opticus and its surroundings, by Dr. F. Schnopfhagen.

## SOCIETIES AND ACADEMIES

### LONDON

Royal Society, March 6.—“Preliminary Report upon the *Comatulæ* of the *Challenger* Expedition.” By P. Herbert Carpenter, M.A., Assistant Master at Eton College. Communicated by Sir Wyville Thomson, F.R.S. Published by permission of the Lords Commissioners of the Treasury.

The collection of *Comatulæ* made by the staff of the *Challenger* includes specimens from 45 different localities, but few of which are deep-water stations. *Comatulæ* were only obtained seven times from depths exceeding 1,000 fathoms.

At lesser depths, 200—1,000 fathoms, *Comatulæ* were met with at 13 stations; but by far the greatest number both of species and of individuals were dredged at depths much less than 200 fathoms, and often less than 20 fathoms, at 26 widely distant stations.

The collection contains 111 species, mostly new; but as the work of examination and description progresses, it is not unlikely that forms now considered different may turn out to be merely local varieties of one and the same species, so that the number given above may be subject to alteration.

Of these 111 species, 59 belong to the genus *Antedon*, 48 to *Actinometra*, 1 to *Ophiocrinus*, and 3, which are peculiar in having ten rays to the calyx instead of only five, to a new genus for which is proposed the name *Promachocrinus* (πρῶμαχος *Challenger*).

The distribution of *Promachocrinus* is as follows:—

<i>P. Kerguelensis</i> (20 arms).	Balfour Bay, Kerguelen, 20—60 fath.
	Royal Sound, „ 28 fath.
	Cape Maclear „ 30 „
	Heard Island 75 „
<i>P. abyssorum</i> (10 arms).	Station 147 „ 1,600 „
	„ 158 „ 1,800 „
<i>P. Naresii</i> (10 arms).	„ 214 „ 500 „

*Ophiocrinus* was obtained at four localities at depths varying from 565 to 1,070 fathoms, two in the South Pacific off South Australia and New Zealand respectively, and two in the North Pacific, one off Japan, and one just north of the Philippine Islands. All the specimens belong to one species, which is by no means so slender and graceful as Semper's Philippine species from shallower water, but has a much more massive arm skeleton.

The comparative distribution of the other *Comatulæ* is very striking. Relatively speaking, *Actinometra* is extremely limited in its range, both geographical and bathymetrical. It is almost exclusively a tropical genus, its northern limit being about 30° N. lat. and its southern 40° S. lat. Isolated species are known from the Cape of Good Hope, Natal, South Australia, and Port Jackson, but its chief home is Oceania, especially the Philippines and Moruccas. A few *Actinometra* species are also known from the west coast of the Atlantic, as South Carolina, the West Indies, Bahia, and St. Paul's Rocks.

The bathymetrical limit of *Actinometra* is likewise very slight. Nearly all the *Challenger* species are from depths less than 20 fathoms, while only three come from a greater depth than 100 fathoms. The individual species of *Actinometra*, like the genus itself, are very local in their distribution. Each of the forty-eight species of the *Challenger* collection has its own locality.

With *Antedon*, however, the case is different. Not only do nearly all the deep-sea *Comatulæ* belong to this genus, but some species of it have a fairly wide range. *Ant. rosacea* ranges from the north of Scotland to the Mediterranean, while *Ant. Eschrichtii* is found over a much wider area. It is well known on the American coast, and was dredged by the *Challenger* off Halifax, while the *Porcupine* met with it in the “cold area” of the North Atlantic.

Some *Antedon* species occur in duplicate from different localities. Two species from near the Kermadec Islands (S. 170), also occur in the neighbourhood of the Fijis (S. 174, 175). A third species was dredged at Stations 147 and 160, two localities in the Southern Sea, in nearly the same latitude, but separated by almost 90° of longitude. A fourth species came up from 1,070 and 775 fathoms, off the Admiralty Islands and Japan respectively.

The above facts would seem to show that, with few exceptions, the geographical range of the individual members of the family *Comatulidae*, is exceedingly limited, nearly every species having its own locality, and that not a very extensive one.

The voyage of the *Challenger* has settled a curious question in connection with the Crinoids, the origin of which is due to Loven. It refers to *Hyponome Sarsii*, a so-called recent Cystid, which turns out to be nothing more than the disk of a *Comatula*, minus its skeleton. The ambulacral plating may be very extensive, forming a complete pavement over the ventral surface of the disc as in many *Pentacrinis*; and the ambulacra are not wide and open as is usual in most *Comatulæ*, but almost entirely closed by the approximation of the marginal leaflets at their sides, so that the food-grooves radiating from the mouth are converted into tunnels.

The plates in the marginal leaflets are probably movable as unuplated leaflets are in *Antedon rosacea*; so that they can be erected when the arms are spread out, leaving the grooves open for food particles to travel towards the mouth. On the other hand, when the arms are all contracted over the disk, the marginal plates fold over the grooves and cover them in. This is the condition of most spirit-specimens, but it is not in any way comparable to that of the palæozoic crinoids, in which the mouth is truly subterminal while the ambulacra become real tunnels beneath the upper surface of the vault.

Sections through one of these plated *Hyponome*-disks show that all the various structures which underlie the grooves of ordinary *Comatulæ* are present and exhibit their usual characters.

The examination of the *Challenger Comatulæ* has entirely confirmed the opinions held by Dr. Lütken and the author respecting the distinguishing characters of *Antedon* and *Actinometra*. Both agree in referring forms with a (sub) central mouth, five equal ambulacra, and no terminal comb on the oral pinnules, to *Antedon*. On the other hand, species with an eccentric mouth, a variable number of unequal ambulacra, and a terminal comb to the oral pinnules, belong to *Actinometra*.

It will be seen at once that these characters are of no use in distinguishing the genera of fossil *Comatulæ*. But, there are very considerable differences in the shape of the radials and centrodorsal piece in *Antedon* and *Actinometra* respectively, and as these are exactly the parts which are most met with as fossils, the generic determination of a fossil form is almost as easy as that of a recent one, which has given up its disk to produce a *Hyponome*. The author has shown elsewhere that in *Act. polymorpha* and *Act. solaris*, half, or even more than half, of the arms may have neither ventral groove, tentacles, ambulacral epithelium, nor ambulacral nerve. No less than 23 out of the 48 species of *Challenger Actinometra* may have more or fewer of such ungrooved arms, in which the ambulacral nerve is entirely absent. These arms are usually those which come off from the hinder part of the disc, but in one gigantic Philippine species with over 100 arms, there are several ungrooved arms on each radius. Evidence of this negative character appears to the author to be a serious objection to the German view, that the ventral bands constitute the sole nervous apparatus of the crinoids; and on the other hand, to strengthen the opinions held by Dr. Carpenter, and by the author, that the axial cords of the skeleton are also nervous in character.